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KITCHEN BOILER

AND

WATER PIPES.

GRIMSHAW.

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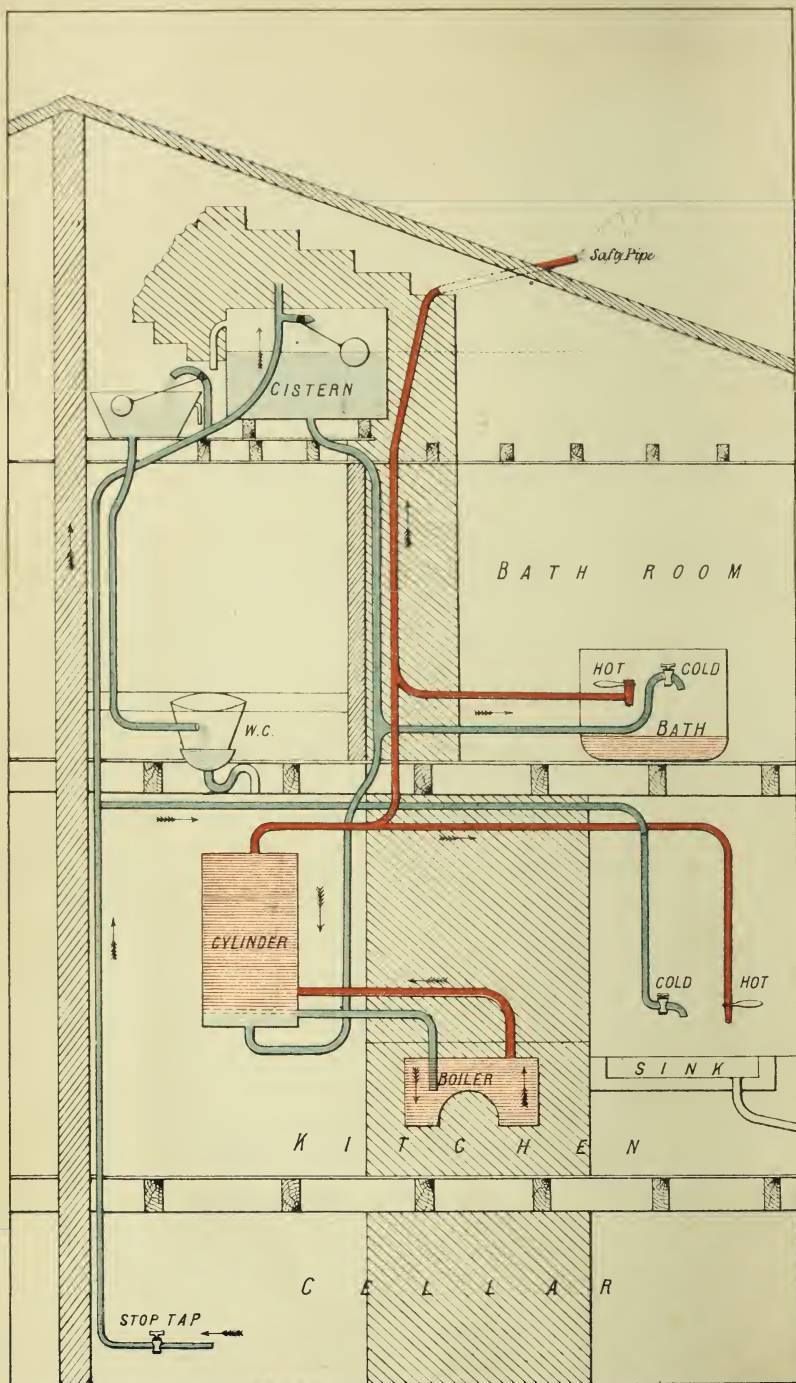
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THE KITCHEN BOILER AND WATER PIPES.

A FEW WORDS ON
THEIR ARRANGEMENT AND MANAGEMENT;
MORE ESPECIALLY
THEIR TREATMENT DURING FROST, AND HOW TO
AVOID EXPLOSIONS.

BY
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THE KITCHEN BOILER

AND

ITS MANAGEMENT.

THE kitchen boiler being so common a convenience in these days of improved appliances, even in houses of comparatively low rental, and the inconvenience, not to say danger, attendant on any defect or disarrangement of such a piece of apparatus, more especially during the prevalence of frost, being so universally acknowledged, the writer considers that a few plain and simple instructions on the arrangement and management of the boiler and its water system, may be found of some utility.

Immediate reference to the accompanying diagram will be the readiest way to make the reader acquainted with the leading features of the hot and cold water pipes of a house. The illustration represents a common and good, though not perfect, pipe system in a house of modern erection. Let us commence with the entrance of the water into the premises. In the cellar or basement we find on that side of the house nearest to the *watermain* in the street, and therefore almost necessarily the front, a

lead pipe of tolerably large dimensions, which enters through the wall at three or more feet below the level of the ground outside. Three feet is the least depth at which the water regulations allow pipes to be laid, on account of the possibility of their being affected by the frost at any less depth. On this pipe, which we will call the supply pipe, is placed close to the wall the *stop tap*, which serves to turn on or off, that is, connect or disconnect the whole system of pipes from the main. In badly arranged houses it is sometimes the case that the only disconnection from the main is by turning off a stop tap common to several houses, say a row or a portion of a row, and in this case it is often placed outside. This is an arrangement altogether to be condemned, as involving delay in finding it, from its being possibly *buried in a garden* or frozen up, and also inconvenience to adjoining tenements should repair or leakage render the turning off of the water of any one house necessary.

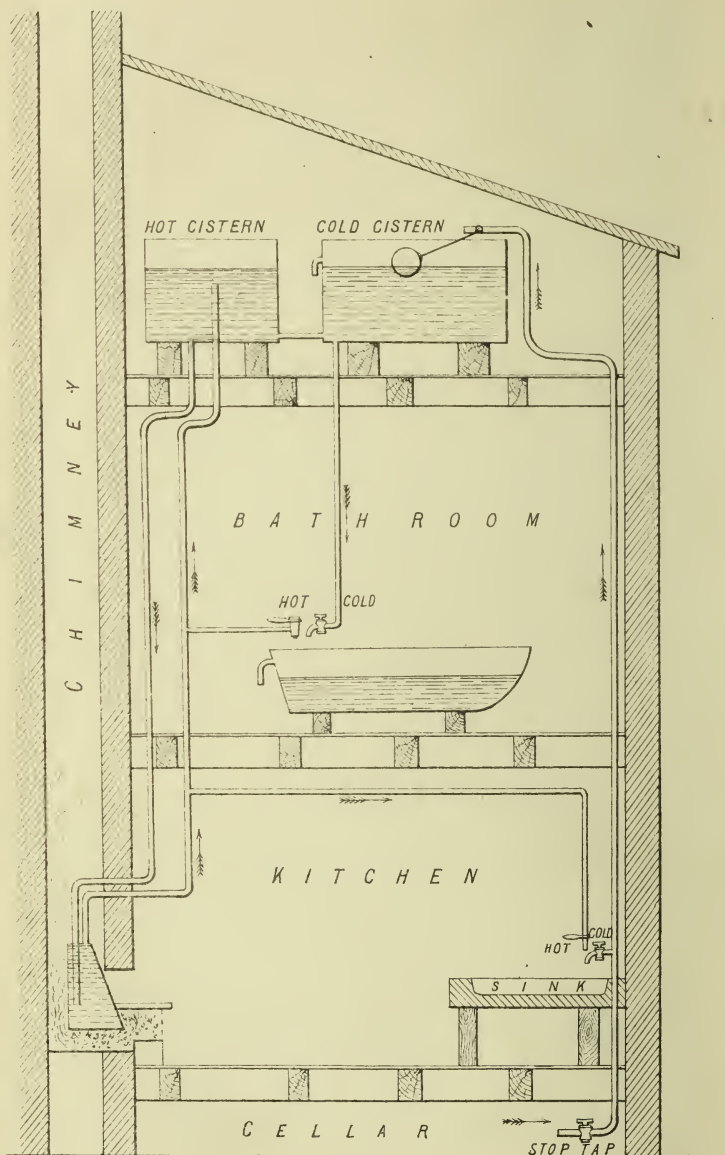
Having made a long "stop" at this particular tap, we may proceed along the flow of the water supply. The supply pipe proceeds in a more or less direct line along the walls, imbedded in the plaster thereof, to the kitchen, and upwards to the cold-water cisterns at the top of the house. In the diagram the pipes, &c., containing *cold* water are coloured *blue*, and the *hot-water* pipes *red*. The branch from the supply to the cold-water tap at the *sink* runs along above the ceiling, behind the flue of

the kitchen range. At the top of the house the supply branches into two and feeds, by *ball taps*, the *main cistern* on the right, and the small *water-closet cistern* on the left. It is scarcely necessary to explain that the *ball* of these taps floating on, and resting with the water, turns off the tap as soon as the level reaches the overflow pipe, and *vice versâ*. With the small cistern containing the apparatus in connection with the W.C., we need not concern ourselves at present, and I merely mention that it should for several reasons *always be quite separate from* the main cistern. This latter-mentioned cistern is the source from which runs the water to every other part of the pipes represented in the illustration, and the force of the descending column of water in the pipe attached to the bottom of the cistern, causes the rise of the water to any tap below this level, the whole system, so long as there is any water in this reservoir, being filled up to that level, as is represented by the dotted line at the water surface. The water from the cistern descends in the first place directly to the *cylinder*. This is invariably made of stout copper, and placed in as near a place as possible to the kitchen fire, which heats the boiler. The cylinder is connected at its lower part with the boiler by means of two pipes, which, like all previously mentioned, are *made of lead*, whilst the boiler is of cast iron,* arched underneath. The cold water at the bottom of the cylin-

* See Appendix.

der flows *to* the boiler by the *lower* pipe, whilst after it is heated, and therefore becomes lighter, it returns through the *upper* pipe, the directions being indicated by arrows on the diagram. The cold water therefore constantly remains at the bottom of the cylinder, and circulating through the boiler collects at the upper portion of the cylinder where the *hot-water supply pipe*, which, by its branches, feeds all the hot-water taps in the house, is attached. In the case we are considering these are simply the hot-water tap over the kitchen sink and the hot-water tap to the bath, but it will be understood that the hot water would rise to a tap placed anywhere below the level of the water in the *cistern* above. The cold-water tap to the bath receives its supply from the *down pipe* from the cistern. This is a good arrangement, as a small supply of cold water is ensured, in case anything should happen to stop the tap on the pipe direct from the main.

The upper extremity of the *red* pipe in the diagram is the safety pipe from the cylinder, up which steam and a little water will escape when the boiler is working too energetically, which is generally indicated by a loud, bubbling, rumbling noise in the cylinder, a noise which, by the way, generally infects the servant maid with the conviction that she is straightway about to be blown to pieces. This too rapid boiling may be stayed by cooling the cylinder by drawing at one of the taps a couple of gallons of hot water.



OLD FASHIONED AND DANGEROUS ARRANGEMENT
(Without Cylinder)

This is perhaps the place to explain the *use* of the cylinder. The object of this apparatus is to prevent the water in connection with the boiler being *entirely* drawn off or boiled away. It is a comparatively modern addition, and previously the water descended directly from the *hot-water cistern*, and ran back through the boiler by another pipe to the same hot-water cistern, which was placed alongside the cold cistern, both often being placed outside the house and connected together at the bottom of each by a pipe. This old-fashioned dangerous plan is illustrated on the adjoining page. In this arrangement the hot and cold water cisterns could both by carelessness or otherwise be drawn quite dry, and no water but the small quantity in itself and the pipes left to keep the boiler filled. Accidents then commonly occurred through the boiler becoming dry, then red hot, and suddenly, whilst in that state, receiving a portion of cold water which either cracked it, or whose sudden expansion into steam exploded it, fortunately generally the former. With such a cylinder as has been described the boiler never can be run dry, for the exit pipe from the cylinder being at the *top* of the cylinder, it never can be emptied, although the cistern may be entirely drawn off. The cylinder being full of water, the boiler will not boil dry for several weeks if not fired very heavily.

This much having been said on the arrangement of the kitchen boiler and its pipes, we may have a

few words on their management. In the first place, I may say that during the greater portion of the year, spring, summer, and autumn, no "looking after" is required, or none to speak of, the arrangement being automatic or self-acting. A tap may stick a little or break, an overflow pipe become stopped up, but nothing serious is ever likely to occur requiring urgent attention if the fitting has been done as it should be. Attention may be here called to the desirability of avoiding the placing of any kind of tap between the cistern and the cylinder, or between the cylinder and the outlet of the safety pipe, as such taps are quite unnecessary, and only serve to render a stoppage by an accumulation of rust or dirt more likely to occur. Should, of course, the two pipes just named become stopped by such means there is just as much danger as if the outlets were frozen. It is in the winter when King Frost holds his revels and binds up the liquid water into transparent ice, that terror and dismay and unearthly noises assail the domestic circle. In all places exposed for a sufficient length of time to the cold external atmosphere, the water in pipes is converted into solid ice, completely filling them up, as the water in the act of freezing expands; indeed, so much greater is the bulk of the ice than that of the water from which it is formed, that the pipes are often bursted; which bursts, however, do not show themselves until the *thaw* comes, and the water finds its way out of the leaks so made. King Frost

“sows” the harvest of the plumber, but it is gathered in the “thaw.”

Now, how are we to encounter this insidious enemy? I will say to begin with that it would very seldom indeed happen that there would be any freezing of pipes at all if the precaution were taken in buildings to avoid *outside* walls in laying the pipes, and never to place the cistern against the roof. Make the cistern smaller if necessary, but contrive to place it beneath the ceiling of some room or passage, not close under the slates where the temperature is very little higher than that of the open air. The cold supply might perhaps have an attack of “frost” just were it enters the cellar, but some cloths laid along the pipe, wetted with very hot water, will put this right in a very short space of time. Should the plumber be compelled to fix the cistern between ceiling and roof, then the next best thing is, as shown in our diagram, to place it and its connecting pipes in close proximity to the chimney breast. This is shown by the “shading.”

But suppose this is not so, or in spite of it the pipes “will” freeze if let alone, what must then be the course of proceeding? Well, say in respect to the cold-water supply first. One method which the water authorities do not approve of, and which is also a very *uncertain* preventive, is to “leave the tap running” day and night, the motion of the water preventing the cooling in the pipes and formation of ice crystals. Another, the best way, is to

empty the pipes at night, seeing during the day that the water in them is frequently kept in motion, as it generally will be by the usual demands on the taps. The pipes are emptied at night by seeing that there is a tap in the cellar at a lower level than the rest of the pipe system, and connected to it by a *straight* pipe without *any* bends. Last thing in the evening turn off the stop tap, open all the cold-water taps in the upper regions, and then open the *run-off* tap just described. The consequence of this is that the water siphons out of all the pipes, there is none left in to freeze during the night, and all is right when the water is turned on again in the morning.

And now ! to keep the pipes in connection with the boiler safe. How can I keep my hot-water pipes from freezing ? said some one. *Hot-water* pipes cannot freeze, so keep them hot. This is the best plan : keep the usual fire in the kitchen range, draw off at intervals a little hot water, then all the *hot-water* pipes will be kept at least *warm*, the cold-water pipes from cistern to cylinder will be kept in motion, and the ball tap and pipe also. At night damp the fire down with “ slack ” and ashes, slightly wetted, so that it will keep in till morning or nearly so, and after damping down run a quart or so of hot water from the tap to give a final “ move ” to the pipes. With a cylinder in the circuit of the pipes, as I have said, there is no danger of the boiler becoming dry, and such an accident happening as

previously described ; explosion can only result from *all* the pipes to and from becoming blocked up. This will never be the case so *long as hot water can be drawn*, as there can be no flow without the feed-pipe from the cistern being open. Therefore, keep everything warm, and should even the ball tap cease to act, keep a foot of water in the cistern by hand ; a few buckets of water from the nearest tap will do this (letting hot water be used if there is any sign of the exit pipe being frozen), and then at all events the inconvenience of “ no kitchen fire ” need not be suffered, and the escape pipe from the cylinder will always be open, and contain hot water, rendering explosion impossible. Should the fire inadvertently remain out for any length of time, and the pipes to the cylinder become frozen, so that the hot-water tap cease to run, the fire should not *on any account* be relighted until the thaw or application of heat to the pipes has opened them so that these taps are in action.

It may be thought that even such a brief description as the above pretends to be, should contain some mention of the *safety valves* which are constructed for kitchen boilers. There are several excellently made valves for this purpose, but I prefer not to complicate the subject by describing them here, but advising my readers, should they adopt such an appliance, not to allow the knowledge that the boiler or cylinder is furnished with a safety valve to lead to a neglect of the taking in time of

some of the simple precautions which have been alluded to, and which are really, if intelligently performed, less trouble to take than to read.

In conclusion, I would certainly impress upon the householder that it is very well worth his while before entering a new house to endeavour to ascertain something about the water arrangements in connection with the boiler, &c., and in winter to see that *at the commencement* of a frost, some of these simple precautions are taken, that is, of course, if he wishes to enjoy his “*otium cum dignitate*” whilst the frost lasts.

APPENDIX.



ON after consideration it has seemed advisable to add a few explanatory words upon some points connected with kitchen boiler arrangements.

Material of the Boiler.—The usual material, as I have stated above, of which the kitchen boiler is constructed, is *cast iron*. The principal, indeed one might say, the sole reason why this material is used is its cheapness, and in most circumstances this will decide its preference. Its chief disadvantage is its inelastic nature and brittleness. From the former cause, should the water in the boiler become entirely frozen, the expansion will probably fracture the cast iron, and the brittleness of this material renders an explosion very destructive. These risks it has been proposed to meet in various ways. (1) To make the boiler entirely of sheet copper, which is a very elastic and tenacious material, and would “rip” under pressure, and not “fly” into pieces. This plan will be found very effective but expensive. (2) To use instead of the entire copper boiler, a *safety plate* of copper sheet or similar metal, say *block tin*. This will be as effective as the first plan, and very much cheaper, as there is needed simply

a small “manhole” on the top of the boiler, over or under which is riveted a sheet of one of the metals named; this being of such a thickness as will cause it to give way to a pressure somewhat over that of the column of water from the cistern overhead. This may be calculated as about half a pound to a vertical foot of water. (3) The other means of meeting these risks has been already mentioned, and is that of a *safety valve*, and should a valve be applied, it ought to be a *dead-weight* valve, or one in which the weight acts directly, not by means of a lever or other medium.

Safety Valves.—The dead-weight safety valve is now made specially for kitchen boilers, and should be fixed directly on the top of the boiler into which it is screwed. It is advisable that a small iron framework and door should be set in the back of the range immediately opposite the safety valve, so that it may be easily got at if necessary.

Vacuum Valve.—This is a valve so constructed as to act in the *opposite* way to a safety valve. That is to say, it will open inwards, but not outwards. Its office is to prevent the collapse of the copper cylinder in case it should become empty or partly empty through the escape pipe being stopped up and the steam in the cylinder condensing. In cases like this a partial vacuum is formed in the cylinder, and the pressure of the atmosphere may become so great as to crush in the cylinder, and render it useless.

The vacuum valve prevents this by admitting air into the cylinder whenever the internal pressure becomes lower than the ordinary atmospheric pressure of 15 lbs. to the square inch.

The Safety Plug.—This is a plug of very fusible alloy, inserted in a hole near the lower part of the boiler, which on the latter becoming dry, or nearly so, is melted, and the aperture thus formed prevents the accumulation of pressure. A *safety plate* of block tin, as mentioned, would render the “plug” almost unnecessary.

Run-off Pipe.—It has been recommended to attach a pipe of iron or copper to the side of the boiler, close to the bottom, and bring this through the brickwork into the kitchen and place a good tap on the end. This is intended to clear any sediment away by running off the water by this pipe.

Separate Flue.—In all cases where it is possible—and it can scarcely occur that it should be otherwise—the kitchen boiler ought to be heated by a distinct flue controlled by its own damper, so as to be worked quite independently of the flues proceeding to *ovens*, &c. If the flue is so arranged, then, of course, more or less heat can be applied to the boiler, or it can be entirely cut off, as may be advisable. Where there is no damper a very great waste of heat and fuel is caused by more fire than is necessary finding its way under the boiler.

One of the latest attachments for the kitchen

boiler is a mercurial indicator and safety valve combined, which is fixed upon the wall in the kitchen, or other convenient room, and attached by a pipe to the boiler or hot-water pipes. It is constructed on the principle of the barometer tube, the rise and fall of the mercury indicating the height of the water in the supply cistern. Should the pressure in the boiler become excessive the mercury is insufficient to balance it, and the steam escapes at the top of the tube.

It has been thought necessary to briefly mention the above contrivances, but none but a separate flue does the writer consider absolutely indispensable. If inclined to "indulge in improvements" he would adopt simply a block-tin safety plate, or a good safety valve, and reiterates that with ordinary care, and the arrangement represented in our diagram, there will be no danger of explosion and no need for complicated appliances.

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